

Phase Transition of Zeolite Rho at High-Pressure

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Beamline(s): X7A

Unit cell parameters of several cation-exchanged forms of zeolite rho were determined up to 3.0 GPa using a diamond-anvil cell and a 200 μm -focused monochromatic synchrotron radiation [1]. Under similar conditions in a water-bearing 4:1 methanol: ethanol mixture pressure-medium, all three zeolite rho samples, NaCs-rho, Cd-rho and Li-rho, undergo a reversible phase transition from centric to acentric structures. In the case of the NaCs-rho, the volume of the centric form expands upon pressure increase, probably due to the sorption of pressure media into the pores [2] (see Figure). In the Li-rho, the transition back to the centric structure on pressure release is sluggish and occurs over a period of weeks. The Cd-rho shows intermediate back-transition kinetics and compressibility compared to NaCs- and Li-rho, which indicates the pressure response of rho is dependent upon the initial cation distribution in the pores. Analysis on peak half-width indicates the existence of deviatoric stress in acentric phase, which is released upon transition back to the centric form.

Acknowledgments: This work was supported by the National Science Foundation through grant NSF-DMR 0095633. YL is grateful for support from an ACS-PRF grant to pursue high-pressure studies. Research carried out in part at the NSLS at BNL is supported by the U.S. DOE, Division of Materials Sciences and Division of Chemical Sciences (DE-Ac02-98CH10886 for the X7A beamline). We acknowledge the Geophysical Lab of the Carnegie Institute for allowing us the use of the ruby laser system associated with the beamline X17C.

References:

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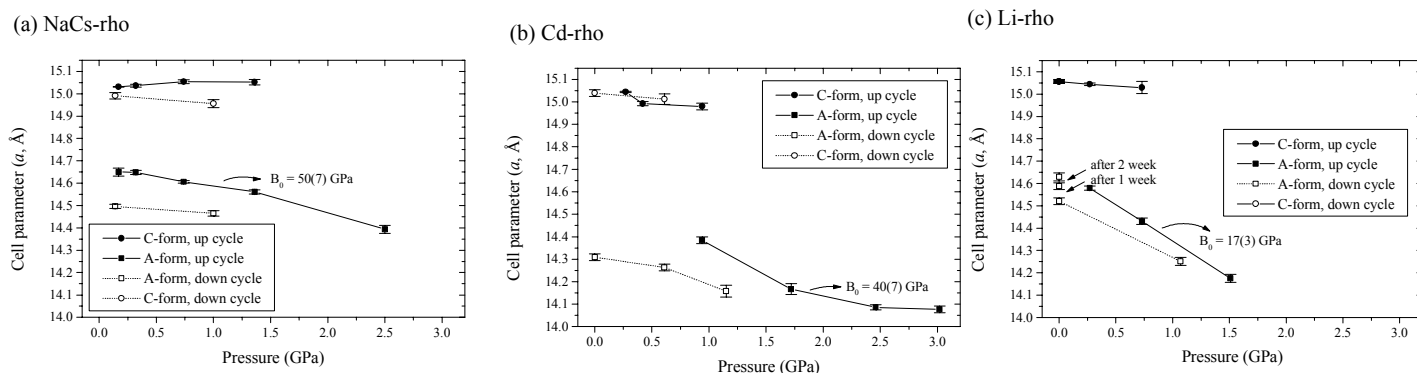


Figure. Changes in cubic cell constant (a , Å) of (a) NaCs-rho (b) Cd-rho and (c) Li-rho as a function of pressure. Esd's are multiplied by three at each point.